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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/273,806	03/22/1999	KENNETH J. DUDA	CIS-057	7598

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EXAMINER	
NGUYEN, VAN H	

ART UNIT	PAPER NUMBER
2194	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/273,806	DUDA ET AL.	
	Examiner	Art Unit	
	VAN H. NGUYEN	2194	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-3, 6-32, and 35-57* is/are rejected.

7)☒ Claim(s) *4,5,33 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-57 are presented for examination.

2. The first 4 lines of claim 30 should be replaced with "a scheduling apparatus for scheduling a computer resource among a plurality of elements, comprising:".

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 02, 2005 has been entered.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 6-32, and 35-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jones et al.** (U.S. 5, 812,844) in view of **Srinivasan et al.** (U.S. 5, 991,812).

As to claim 1:

a. Jones teaches the invention substantially as claimed including a computer implemented method for scheduling *(e.g., scheduling the execution; see the abstract)* comprising the steps of:

scheduling a resource among a plurality of elements *(e.g., scheduling the execution of a plurality of threads; see the abstract; scheduler to schedule the use of one or more processors...schedule the use of other resources; col.5, lines 1-5)* by:

(i) detecting expiration of a period-of-use of the resource, the resource allocated to an active one of the plurality of elements for the period-of-use *(col.4, line 62-col.5, line 29 and col.7, lines 19-54);* and

(ii) updating a measure-of-use of the resource for the active one of the plurality of elements responsive to the period-of-use and a measure-of-use adjustment *(fig. 7 and associated text).*

b. Jones does not explicitly teach "assigning one of the plurality of elements to use the resource for a second period-of-use responsive to the measure-of-use and an element-specific selection adjustment for each element in the plurality of elements

wherein the element-specific selection adjustment for the each element in the plurality of elements is borrowed virtual time".

c. Srinivasan teaches assigning one of the plurality of elements to use the resource for a second period-of-use responsive to the measure-of-use and an element-specific selection adjustment for each element in the plurality of elements (col.3, lines 5-39) wherein the element-specific selection adjustment for the each element in the plurality of elements is borrowed virtual time (col.7, lines 1-33) .

d. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Srinivasan and Jones because Srinivasan's teachings would have provided a much greater flexibility for resource scheduling.

As to claim 2:

Jones teaches the period-of-use is a scheduled period-of-use *(col.5, lines 57-65 and col.12, lines 1-28).*

As to claim 3:

Jones teaches the plurality of elements is a plurality of threads of-execution and the resource is time available to a central processor unit to execute the plurality of threads-of-execution *(abstract and col.6, lines 56-67).*

As to claim 6:

Jones teaches adding a new thread to the plurality of threads-of-execution by a parent thread; and initializing the virtual time for the new thread using the virtual time of the parent thread *(col.col.11, line 26-col.12, line 28).*

As to claim 7:

Jones teaches the plurality of threads-of-execution includes a set of ready threads and a set of blocked threads *(figs. 9C-9D and associated text).*

As to claim 8:

Jones teaches adjusting each of the set of blocked threads by an adjustment value *(figs. 9C-9D and associated text).*

As to claim 9:

Jones teaches updating a system reference-use of the resource *(fig. 2 and associated text).*

As to claim 10:

Jones teaches determining that one of the set of blocked threads has become ready; and updating, responsive to the step of determining, a virtual time for the one of the set of blocked threads or to the system reference-use as adjusted by a lag limit *(figs. 9C-9D and associated text).*

As to claim 11:

Jones teaches (a) determining that one of the set of blocked threads had become blocked; (b) saving the system reference-use and a current real-time value associated with the one of the set of blocked threads; (c) determining that the one of the set of blocked threads has become ready; and (d) updating a virtual time for the one of the set of blocked threads responsive to step (c) and further responsive to the saved system reference-use, the saved current real-time, and the system reference-use *(figs. 9C-9D and associated text).*

As to claim 12:

Jones teaches the system reference-use is updated to converge towards a virtual time average over the set of ready threads *(figs. 9C-9D and associated text).*

As to claim 13:

Jones teaches the step of updating the system reference-use is accomplished substantially in accordance with:

reference-use=max(reference-use,

min(reference-use+R+RCost, EVT));

where reference-use is the system reference-use, R is a convergence rate, RCost is a resource usage, and EVT is an effective virtual time, and the resource usage is a function of the period-of-use and the measure-of-use adjustment assigned to the active one of the plurality of threads-of-execution *(fig. 7 and associated text).*

As to claim 14:

Jones teaches the step of updating the system reference-use is accomplished substantially in accordance with:

reference-use += max(-MaxChange,

min(MaxChange, meanAVT-reference-use));

where reference-use is the system reference-use, MaxChange is responsive to a resource usage, and MeanAVT is an average AVT over a set of the plurality of elements, and the resource usage is a function of the period-of-use and the measure-of-use adjustment assigned to the active one of the plurality of threads of-execution *(fig. 7 and associated text).*

As to claim 15:

Jones teaches adding a new thread to the plurality of threads-of-execution; and initializing the virtual time for the new thread using the system reference use *(col.col.11, line 26-col.12, line 28).*

As to claims 30-32 and 35-44:

Note the rejection of claims 1-3 and 6-15 above. Claims 30-32 and 35-44 are the same as claims 1-3 and 6-15, except claims 30-32 and 35-44 are apparatus claims and claims 1-3 and 6-15 are method claims.

As to claims 55-57:

Note the rejection of claims 1-3 above. Claims 55-57 are the same as claims 1-3, except claims 55-57 are computer program product claims and claims 1-3 are method claims.

As to claim 16:

a. Jones does not explicitly teach the plurality of elements is a plurality of queues and the resource is the bandwidth of an output port of a data switch.

b. Srinivasan teaches the plurality of elements is a plurality of queues and the resource is the bandwidth of an output port of a data switch *(col.3, lines 10-40).*

c. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Srinivasan and Jones because Srinivasan's teachings would have provided a fair queuing technique that uses few basic computations such as additions and subtractions that reduce computation overhead for hardware and software implementations.

As to claim 17:

Srinivasan teaches updating a virtual time for the active one of the plurality of queues *(fig.6 and associated text).*

As to claim 18:

Srinivasan teaches the period-of-use is a transmission time period required to transfer one or more data packets from one of the plurality of queues to the output port *(col.4, lines 41-57).*

As to claim 19:

Srinivasan teaches the plurality of queues includes a set of non-empty queues and a set of empty queues *(col. 4, line 58-col.5, line 22).*

As to claim 20:

It includes the same limitation as claim 7 above, and is similarly rejected under the same rationale.

As to claim 21:

Srinivasan teaches (a) determining that one of the set of non-empty queues has become empty; (b) saving the system reference-use and a current real-time value associated with the now-empty queue; (c) determining that the now-empty queue has become non-empty; and (d) updating a virtual time for the now-non-empty queue responsive to step (c) and further responsive to the saved system reference-use, the saved current real time, and the system reference-use *(fig.8 and associated text).*

As to claim 22:

Srinivasan teaches the system reference-use is updated to converge towards a virtual time average over the non-empty queues *(col.4, lines 53-67).*

As to claim 23:

a. The rejection of claim 13 above is incorporated herein in full. Claim 23 further recites a weight assigned to the active one of the plurality of queues.

b. Srinivasan teaches a weight assigned to the active one of the plurality of queues *(col.5, lines 1-22).*

As to claim 24:

a. The rejection of claim 14 above is incorporated herein in full. Claim 24 further recites a weight assigned to the active one of the plurality of queues.

b. Note the discussion of claim 23 above for rejection of "a weight assigned to the active one of the plurality of queues."

As to claim 25:

a. The rejection of claim 15 above is incorporated herein in full. Claim 25 adding a new queue to the plurality of queues.

b. Srinivasan teaches adding a new queue to the plurality of queues *(col. 12, lines 3-12).*

As to claim 26:

Srinivasan teaches adjusting each of the set of empty queues by the adjustment value when the system reference-use is updated *(fig. 6 and associated text).*

As to claims 27-29:

They include the same limitations as in claims 22-24 and are similarly rejected under the same rationale.

As to claims 45-54:

Note the rejection of claims 16-29 above. Claims 45-54 are the same as claims 16-29, except claims 45-54 are apparatus claims and claims 16-29 are method claims.

Allowable Subject Matter

5. Claims 4, 5, 33, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments with respect to claims 1-57 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry or a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VAN H. NGUYEN whose telephone number is (571) 272-3765. The examiner can normally be reached on Monday-Thursday from 8:30AM - 6:00PM. The examiner can also be reached on alternative Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Meng-Ai An can be reached on (571) 272-3756.

The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any response to this action should be mailed to:
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vhn

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PRIMARY EXAMINER